Department of Transportation
Federal Aviation Administration
Aircraft Certification Service
Washington, DC

TSO-C106

Date: 1/15/88

Technical Standard Order

Subject: TSO-C106, AIR DATA COMPUTER

a. Applicability.

(1) Minimum Performance Standard. This technical standard order (TSO) prescribes the minimum performance standard that air data computers must meet in order to be identified with the applicable TSO marking. New models of air data computers that are to be so identified and that are manufactured on or after the date of this TSO must meet the standard set forth in Society of Automotive Engineers (SAE), Aerospace Standard (AS) 8002, "Air Data Computer - Minimum Performance Standard," dated October 30, 1981.

(2) Environmental Standard. The conditions and procedures prescribed in Radio Technical Commission for Aeronautics (RTCA), Document No. DO-160B, "Environmental Conditions and Test Procedures for Airborne Equipment," dated July 1984 are to be used in lieu of RTCA Document No. DO-160A, "Environmental Conditions and Test Procedures for Airborne Equipment," dated January 1980, which is incorporated as a reference in SAE AS 8002.

(3) Deletion. Paragraph 4.2.

(4) Addition. The following shall be used in place of paragraph 4.2:

Static Source Error Correction (if applicable)

Unless otherwise noted, outputs may be corrected for static source errors of the specific aircraft model in which the computer is intended to be used.

The tolerance of the correction value produced form the correction profile (correction curve) residing in the computer shall be the sum of the following:

A. ±15% of theoretical value of correction or equivalent of ±.0025 in Hg static pressure, whichever is greater.

B. Value of correction curve slope times the tolerance of independent variable programming the correction curve.

When testing corrected parameters (altitude, airspeed or mach) the nominal value of the parameter at each test point indicated in Tables 1, 3 or 4 shall be adjusted to include the correction value with tolerance limits set per (A) and (B) above.

(5) Exception. TABLE 3, CALIBRATED AIRSPEED: A looser tolerance of ±3.5 knots may be used at the 80 knots reference point.

(6) Computer Software. If the equipment design implementation includes a digital computer, the computer software must be verified and validated in an acceptable manner. One acceptable means of compliance for the verification and validation of the computer software is outlined in RTCA Document No. DO-178A, "Software Considerations in Airborne Systems and Equipment Certification," dated March 1985. For those applicants who elect to use RTCA Document No. DO-178A to demonstrate compliance for the verification and validation of the computer software, the following requirements must be met:

(i) RTCA Document DO-178A defines three levels of software: Level 1, Level 2, and Level 3. The applicant must declare the level (or levels) to which the computer software has been verified and validated. This equipment may incorporate more than one software level. The software for navigation functions must be verified and validated to at least Level 2.

(ii) The applicant must submit a software verification and validation plan for review and approval.

NOTE: The Federal Aviation Administration (FAA) strongly recommends early discussion and agreement between the applicant and the FAA on the applicant's proposed software verification and validation plan, and the applicant's proposed software level or levels.

b. Marking. In addition to the marking specified in Federal Aviation Regulations (FAR) Section 21.607(d), the following information shall be legibly and permanently marked:

(1) On the major equipment components, with regard to FAR § 21.607(d)(2), the part number is to include hardware and software identification, or a separate part number may be utilized for hardware and software. Either approach must include a means for showing the modification status.

(2) Each separate component of equipment that is manufactured under this TSO (antenna, receiver, sensors, display panels, etc.) must be permanently and legibly marked with at least the name of the manufacturer and the TSO number.

(3) The level(s) to which the computer software has been verified and validated.

c. Data Requirements.

(1) In addition to FAR § 21.605, the manufacturer must furnish the Manager, Aircraft Certification Office (ACO), Federal Aviation Administration, having purview of the manufacturer's facilities, one copy each of the following technical data:

(i) Operating instructions.

(ii) Equipment limitations.

(iii) Installation procedures and limitations.

(iv) Schematic drawings as applicable to the installation procedures.

(v) Wiring diagrams as applicable to the installation procedures.

(vi) Specifications.

(vii) List of the major components (by part number) that make up the equipment system complying with the standards prescribed in this TSO.

(viii) An environmental qualification form as described in RTCA Document DO-160B.

(ix) Manufacturer's TSO qualification test report.

(x) Nameplate drawing.

(xi) The appropriate documentation as defined in RTCA/DO-178A, or equivalent, necessary to support the verification and validation of the computer software to Level 1, Level 2, or Level 3. If the software is verified and validated to more than one level, the appropriate documentation for all such levels must be submitted.

(2) In addition to those data requirements that are to be furnished directly to the FAA, each manufacturer must have available for review by the Manager of the ACO having purview of the manufacturer's facilities, the following technical data:

(i) A drawing list, enumerating all of the drawings and processes that are necessary to define the article's design.

(ii) The functional test specification to be used to test each production article to ensure compliance with this TSO.

(iii) Equipment calibration procedures.

(iv) Corrective maintenance procedures (within 12 months after TSO authorization).

(v) Schematic drawings.

(vi) Wiring diagrams.

(vii) Documentation to support the computer software verification and validation plan for Level 1, Level 2, or Level 3 software.

(viii) The appropriate documentation as defined in RTCA/DO-178A, or equivalent, necessary to support the verification and validation of the computer software to Level 1, Level 2, or Level 3. If the software is verified and validated to more than one level, the appropriate documentation for all such levels must be available for review.

(ix) The results of the environmental qualification tests conducted in accordance with RTCA DO-160B.

d. Data to be furnished with manufactured units. One copy of the data and information specified in paragraphs (c)(1)(i) through (viii) of this TSO, and instructions for periodic maintenance and calibration which are necessary for continued airworthiness must go to each person receiving for use one or more articles manufactured under this TSO. In addition, a note with the following statement should be included:

> "The conditions and tests required for TSO approval of this article are minimum performance standards. It is the responsibility of those desiring to install this article either on or within a specific type or class of aircraft to determine that the aircraft installation conditions are within the TSO standards. If not within the TSO standards, the article may be installed only if further evaluation by the applicant documents an acceptable installation and is approved by the Administrator."

e. Availability of Reference Documents.

(1) Copies of SAE Document No. AS 8002 may be purchased from the Society of Automotive Engineers, Inc., 400 Commonwealth Drive, Warrendale, PA 15096.

(2) Copies of RTCA Documents Nos. DO-160B and DO-178A may be purchased from the Radio Technical Commission for Aeronautics Secretariat, One McPherson Square, Suite 500, 1425 K Street, NW., Washington, DC 20005.

(3) Federal Aviation Regulations, Part 21, Subpart O, and Advisory Circular 20-110D, "Index of Aviation Technical Standard Orders," may be reviewed at the FAA Headquarters in the Office of Airworthiness, Aircraft Engineering Division (AWS-120), and at all regional ACO's.

/S/ M. C. Beard
Director of Airworthiness